Annotated Outline for RPP System Plan, Revision 5

The format and scope of the System Plan, Revision 5 (SP5) will be similar to that of SP4, except as noted.

Two cases will be evaluated:

- ***Baseline Case (BC)**, similar to the Baseline Case evaluated in SP4, but modified slightly to reflect current planning bases and given the benefit of a full HTWOS run. The BC will be the technical baseline for updating the PMB/OPER, and will include the following features:*

  The BC will be aligned with the WTP flowsheet, the Integrated Waste Feed Delivery Plan, the SST Retrieval Plan, the new HLW glass model, and the DOE 2004 LAW glass model.

  The BC flowsheet will include an Aluminum Removal Facility to manage sodium, and enhanced sludge blending to reduce HLW glass mass.

  The BC flowsheet will assume that the sludge from 9 potential RH-TRU tanks will be processed in WTP, but waste from 11 potential CH-TRU tanks will be processed through a Supplemental TRU Treatment Facility and stored on-site at the Central Waste Complex (CWC). Additional funding needs will be identified to support the additional storage capacity needed at CWC for the potential CH-TRU drums.

- ***Sensitivity Case A (SC-A)**, which will mirror the scope of the BC, except that the potential TRU waste from 20 tanks (both CH-TRU and RH-TRU) will be processed through WTP. The Supplemental TRU Treatment Facility will be eliminated. This case will be modeled in HTWOS, but it will be presented for information only.*

EXECUTIVE SUMMARY – *Complete rewrite with new results. Explain the general approach for building the baseline given that certain decisions, primarily related to the draft EIS and eventual ROD, are still pending (i.e., maintain current baseline until such time as WM&TC EIS document is complete and ROD has been issued, then make PMB and System Plan consistent with preferred alternatives identified in ROD). Explain approach to mitigate uncertainty of not yet having a Final Disposal Alternative for HLW; etc.*

1.0 INTRODUCTION

1.1 Hanford Site Background – *OK as is*

1.2 River Protection Project System Plan Purpose – *OK as is*

1.3 Planning Improvements since System Plan 4 – *Introduce noteworthy points, but refer to body of text for details:*

- BC vs SC-A –
  Brief explanation of the scope and purpose of each case; both evaluated in HTWOS (refer to §5.0 for modeling result details)
- Draft TC & WM EIS –
  issued for public review and comment (refer to §2.1)
- Draft HFFACO –

Draft Consent Decree is available for public review and comment (litigation is being resolved; "success criteria" replaced by new milestones, specific dates to be provided by ORP, list here) (refer to §2.2)

- Documented Safety Analysis –
  R*evised to implement DSA-3009; describe impact to planning (refer to §2.4)*
- Aluminum Removal Facility –
  preliminary flowsheet development (refer to §3.2.3, 5.0, 6.0, 7.0)
- HTWOS-
  Highlight significant model modifications, especially alignment with WTP processes and incorporation of new glass model (refer to §4.0 for additional details)
- SST Waste Retrieval Plan –
  Rev. 0 issued April 2009; updated SST retrieval sequencing, retrieval technology, related assumptions will be made available to support SP5 modeling
- Integrated Waste Feed Delivery Plan –
  IWFDP rev. 0 issued July 2009; SP5 will reflect planning to support IWFDP for DSTs and WTP feed. SP5 will also discuss alignment with DST upgrade plans and capabilities, and sludge management assumptions, including the planned configuration of each DST and various mixer pump operating parameters.
- New Operations Research (OR) model –
  Highlight ongoing development of new planning tool (refer to §4.0 and 6.0)
- New cost model -
  Highlight ongoing development of new planning tool (refer to §4.0 and 6.0)
- C-Farm waste retrievals -
  In progress; provide real-time field experience with WR technologies (specify which tanks and which techniques, refer to §3.1.1)
- BDGRE issue status
  (refer to §3.1.2, 4.0, 5.0, 7.0)
- National Repository -
  Deferred; expect near-term on-site storage; Hanford Shipping Facility design modified to become Hanford Storage Facility (refer to §3.4.2., 5.0, 7.0)
- Collaboration with SRS engineers regarding different types of mixer pumps and transfer pumps (refer to §6.0)
- MARS –
  Development and deployment experience, path forward (refer to §6.1)
- Mission Analysis Report –
  Explain purpose

1.4 Drivers for Issuing System Plan (Revision 5) – *update*

- Contractual obligation to issue new SP as needed
- New PMB and OPER
- Stimulus Funding and Recovery Act Funding – cost, scope and schedule improvements, projects
- Provides a convenient and well-defined starting point for potential future exploratory cases

1.5 Reference Dates – *update:*

- Tank waste inventory

- Waste tank integrity
- ORP approval of SP5 assumptions
- Radionuclide decay rate
- RPP System Status

1.6 Integrating Documents and Organizations – *update:*

- PMB updated, OPER approved (to be updated in conjunction with SP5 effort)
- Integrated Waste Feed Delivery Plan now issued (to be updated in conjunction with SP5 effort).
- SST Waste Retrieval Plan (to be updated in conjunction with SP5 effort)
- Risk Management Plan

1.7 Success Criteria and Mission Scenarios – *complete rewrite:*

- Success Criteria based on:
  - Proposed HFFACO milestones and consent decree milestones (list)
  - ORP-provided funding guidance
- Description of scope for both BC and SC-A

1.8 Path Forward – *tweak to reiterate collaborative relationship among SP stakeholders; subtle lead-in to expanded role of Ecology in developing SP6 for pending Consent Decree milestone.*

2.0 REGULATORY IMPACTS

2.1 National Environmental Policy Act – *update*

- Update status/impacts of Draft TC&WM EIS:
  - Brief description of TC & WM EIS scope
  - Highlight specific areas where SP and Draft EIS are in alignment
  - Highlight specific areas where SP and Draft EIS differ
  - Anticipated schedule for activities leading to ROD
  - Planning impact of having the ROD issued
  - Consider creating a new flow diagram that shows the decisions/actions that are dependent upon having the ROD issued

2.2 Performance Assessment for Waste Management Area "C" – *current status, plans, path forward for WMA C and Hanford overall.*

2.3 RCRA, CERCLA, and Hanford Federal Facility Agreement and Consent Decree – *update status of litigation, new schedule milestones into planning bases*

2.4 Waste Incidental to Reprocessing and the Waste Determination Process – *update as appropriate*

2.5 Documented Safety Analysis – *TF DSA revised and updated in 2009-10 to implement DOE-STD-3009-94*

3.0 STATE OF THE RIVER PROTECTION PROJECT SYSTEM – *Assume near-complete re-write; include more photos, preferably one photo for each topic*

3.1 Storage

3.1.1 Single-Shell Tanks

- SST Retrieval :
  - Recent accomplishments in C-Farm:
    - C-110 waste retrieval complete to the limits of technology
    - C-104 waste retrieval preparations (2 old pumps safely removed and disposed at ERDF, installation of sluicer pumps, hydraulic sluicers and cameras, trenching and installation of HIHTL with shielding, installation of electrical and water connections, new control trailer; waste retrieval began Jan. 2010.
    - 5 old HIHTL removed from C-Farm*
    - Sampling of hard heel in C-108 required construction and installation of Off-Riser Sampler, a remotely operated device that can move around the bottom of the tank to obtain samples not readily accessible with conventional techniques; sample results
    - C-111 waste retrieval preparations ongoing, removal of obsolete equipment ongoing)
    - Near-term (next 5 years) plans:
      - C-111 waste retrieval scheduled Spring 2010
      - other
  - Recent accomplishments in U-Farm:
    - 6 old HIHTL removed from U-Farm* (*9 of 11 disposed at ERDF)
- WRFs
- Brief overview of SST Integrity Program, including SST Integrity Study
- Mention plans for SST consolidation/staging and issues to be overcome; refer to §5.0, 6.0 and 7.0 for details
- SST Closure Plans – describe current status

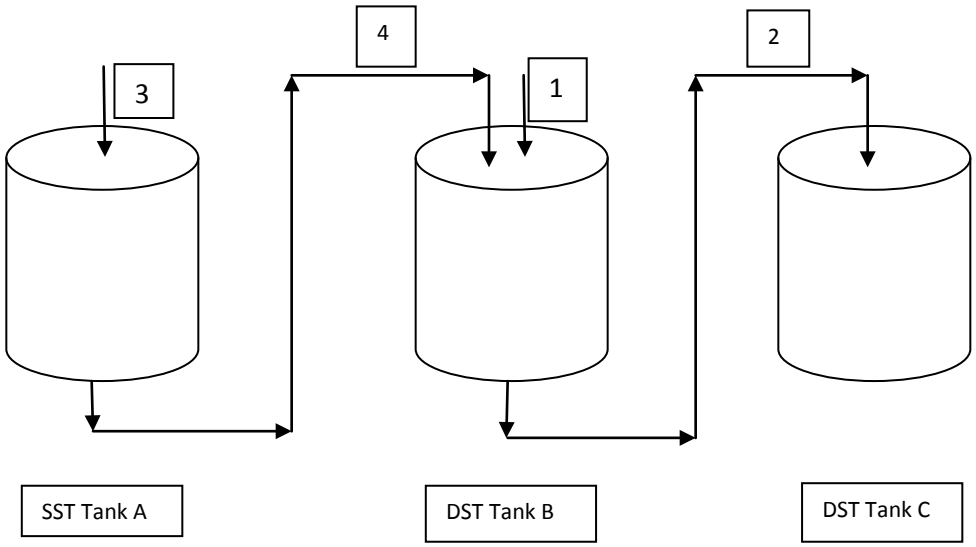
3.1.2 Double-Shell Tanks

- Brief overview of DST Integrity Program
- Describe strategy for deploying DSTs to support SST retrieval, WTP feed staging (consider including flow diagram of DST logic)
- Brief description of ongoing mixing studies (refer to §6.0 for details)
- Describe current work to resolve BDGRE concerns (refer to § 4.0, 5.0, and 7.0)

3.1.3 Other Hanford Facilities and Inactive/Miscellaneous Underground Storage Tanks

3.1.4 Waste Transfer Systems

- Describe recently completed transfers
- Describe near-term (next 5 years) planned transfers for SST Retrieval, Evap ops
- New graphic showing transfers btw labeled tanks, annotated arrows (extremely simplified version below)



1. X Kgal of waste retrieval water (or supernate from Tank X?) added
2. X Kgal waste transferred from Tank B to Tank C.
3. X Kgal waste retrieval water (or supernate from Tank X?)added
4. Y Kgal of waste was transferred from Tank A to Tank B.

Overall benefit: XXX Kgal of SST waste transferred into safer DST storage; YYY Kgal feed staged for evaporator ops, which will yield ZZZ Kgal recovered space.

3.1.5 242-A Evaporator

Describe recent accomplishments (3 campaigns consolidated into 1 campaign; 900 Kgal liquid removed) and near-term (5 years) planned campaigns; what will be evaporated, and how much space will be recovered; also mention recent successful decontamination effort in condenser room (Recovery Act project? Now radiation buffer area)

A Wiped Film Evaporator (WFE) may provide additional evaporator capacity in the future; refer to §3.1.9, 6.0 and 7.0 for details

3.1.6 Waste Encapsulation and Storage Facility

3.1.7 Vadose Zone Integration Program – *briefly describe: new, smaller mobile unit for deploying direct push technology in tank farms, use of surface geophysical exploration to track contaminants beneath S and SX farms; combination of deep electrodes with SGE in C-Farm, 2nd interim barrier to be installed in TY Farm.*

3.1.8 Recovery Act Projects

Include a brief description of these projects, using the same "binning" system used to report progress to DOE-HQ:

- *RA-1 Tank Farm Infrastructure Upgrades*
- *RA-2 Other Infrastructure Upgrades*

- *RA-3 Facilities Upgrades*
- *RA-4 Waste Feed Infrastructure Upgrades*
- *RA-5 Waste Feed Transfer Lines Upgrades*

List the individual projects under each "bin" above. Highlight examples of work that has been accelerated because of RA Funding. Include a photo montage depicting RA project work going on in the field, but do not attempt to provide a photo for each RA project.

1 photo	*2 photo*	*3 photo*	*4 photo*	*5 photo*	*6 photo*	*7 photo*	*8 photo*

3.2 Treatment – *UPDATE ALL*

3.2.1 Supplemental Transuranic Treatment Facility – *briefly discuss status of RH-TRU and CH-TRU strategies, impact to current plans for this facility*

3.2.2 Waste Treatment and Immobilization Plant – *needs more detail, particularly re: interfaces with TOC, also needs one recent photo for each part of the plant*

3.2.2.1 Pretreatment

3.2.2.2 High-Level Waste

3.2.2.3 Low-Activity Waste

3.2.2.4 Analytical Laboratory

3.2.2.5 Balance of Facilities

3.2.3 Aluminum Removal Facility – *update; describe flowsheet development, refer to 6.0 and 7.0 TRL for additional details*

3.2.4 Second Low-Activity Waste Facility – *update as necessary*

3.2.5 Interim Hanford Storage Facility – *describe planned changes to storage capacity and size increment because of repository status and assumed outcome of the Final Disposal Alternative*

3.2.6 Hanford Shipping Facility – *describe plans for this facility based on assumed outcome of the Final Disposal Alternative*

3.2.7 Liquid Effluent Retention Facility/Effluent Treatment Facility – *update roadmap workshop efforts*

3.3 Storage Onsite – *UPDATE ALL*

3.3.1 Interim Hanford Storage Facility

3.3.2 Central Waste Complex

3.4 Disposal Onsite- *UPDATE ALL*

3.3.1 Integrated Disposal Facility

3.3.2 State Approved Land Disposal Site

3.3.3 Central Waste Complex

3.3.4 200 Area Treated Effluent Disposal Facility

3.5 Disposal Offsite - *UPDATE ALL*

3.4.1 Final Disposal Alternative (Planned Offsite Geologic Repository) – *Explain status – use verbiage from draft TC & WM EIS*

3.6 Key Interfaces Among Facilities

4.0 MODELING TOOLS - *Restructure this section to indicate better integration:*

4.1 Dynamic Models

4.1.1 Hanford Tank Waste Operations Simulator Model – *background info OK as is; add new text to describe recent HTWOS/WTP alignment mods, new glass model, WFD Plan alignment, and new SST retrieval assumptions, new sludge blending strategy.*

4.1.2 Waste Treatment and Immobilization Plant Dynamic (G2) Model – *OK as is*

4.2 Operations Research Model – *scope, status, interface with HTWOS, benefit*

4.3 Cost Model – *scope, status, interface with HTWOS, benefit*

5.0 CASE EVALUATION AND RESULTS – *Complete re-write with new results. Reiterate focus on Base Case; Sensitivity Case A results presented for information only. Greatest emphasis and detail related to Base Case. Some aspects of the results for both cases may be displayed side by side to highlight differences in impacts. For the SC-A case, provide highlights of significant results in a separate subsection in Section 5.*

5.1 Base Case Methodology

5.2 Highlights

5.3 Observations

5.4 Storage

5.4.1 Single-Shell Tanks
5.4.2 Double-Shell Tanks
5.4.3 Other Hanford Facilities and Inactive/Miscellaneous Underground Storage Tanks
5.4.4 Waste Transfer Systems

5.4.5 Evaporator
5.4.6 Waste Encapsulation and Storage Facility
5.4.7 Vadose Zone Integration Program

5.5 Treatment

5.5.1 Supplemental Transuranic Treatment Facility
5.5.2 Aluminum Removal Facility
5.5.3 Waste Treatment and Immobilization Plant
5.5.4 Second Low-Activity Waste Facility
5.5.5 Interim Hanford Storage Facility
5.5.6 Liquid Effluent Retention Facility/Effluent Treatment Facility

5.6 Storage Onsite

5.6.1 Interim Hanford Storage Facility
5.6.2 Central Waste Complex

5.7 Disposal Onsite

5.7.1 Integrated Disposal Facility
5.7.2 State Approved Land Disposal Site

5.8 Disposal Offsite *(explain the status of these facilities relative to our baseline)*

5.8.1 Waste Isolation Pilot Plant
5.8.2 Final Disposal Alternative (Planned Offsite Geologic Repository)

5.9 Glass Mass Comparison

5.9.1 Changes in Projected LAW Glass Mass
5.9.2 Changes in Projected HLW Glass Mass
5.9.3 HLW Glass Mass Sensitivity Study: *The sensitivity of the projected mass of HLW glass to relaxation of certain HLW glass formulation model constraints will be discussed. A table of ranges of HLW glass mass estimates both lower than and higher than the Baseline Case will be provided. Recommendations on the direction of ongoing HLW glass development efforts will be provided.*

6.0 TECHNOLOGY DEVELOPMENT – *Update all sections, add ARF, reference Technology Development Roadmap*

Introduction will address the meaning of Technology Readiness Levels; consider including a new figure with a table lifted directly out of existing DOE documents to describe definition of each TRL. Consider including the TRL level for each technology described in 6.0, if it is known. Technology development needs will be organized by category consistent with the categories used in Appendix B, "Key Assumptions and Success Criteria."

6.1 Waste Treatment Complex:

No technology development needs at this time.

6.2 Tank Farms:

Waste Retrieval Technology Development Needs – MARS, et. al
Waste Mobilization and Mixing Needs – discuss collaboration with SRS
Tank Closure Methodology
Waste chemistry and solubility

6.3 WTP:

Glass Formulation Development for both LAW and HLW Glasses
Second generation melters
Identify disposal path for spent WTP HLW melters

6.4 Supplemental Treatment:

Aluminum Removal Facility flowsheet development, TRL improvement plan
Supplemental Treatment and Pretreatment Technology Development Needs

6.5 Interfacing Facilities:

Acceptable waste form for ETF solid waste.

6.6 Cross- Cutting Assumptions:

No technology development needs at this time.

7.0 KEY ISSUES AND UNCERTAINTIES – *Restructure table; add column titled "Mitigating Actions," with WBS element(s) corresponding to ownership of each issue, and a column to indicate in which fiscal year(s) that scope is funded, or if funding is pending. Also regroup issues as appropriate under headings corresponding to the Level 1Critical Risks as defined in the Risk Management Plan, Appendix B, in order to improve alignment btw SP5 and Risk Management Plan. May need to print on 11x17 pages, or use 8½ x 11 landscape orientation.*

Level 1 Critical Risk Categories:

7.1 DST Space Management
7.2 SST Retrieval
7.3 Tank/Waste Management Area Closure Process
7.4 Tank/Waste Management Area Closure Technology
7.5 Waste Treatment Plant
7.6 TC/WM EIS ROD and Regulatory Approval Delay
7.7 222-S Lab Availability
7.8 Inaccurate Mission Decision
7.9 Work Stoppage
7.10 Skill Mix and Labor Shortfalls
7.11 Estimate Uncertainty, Validity of Assumptions, Budget Impacts
7.12 Tank Farm System / Waste Feed Delivery

7.13 Work Scope Projectization Opportunity
7.14 HAMTC Craft Realignment Provision Opportunity
7.15 Recovery Act

New issues/uncertainties to add: SST consolidation (tank integrity, leak detection, emergency space)

8.0 OPPORTUNITIES FOR IMPROVEMENT – *Revisit all. Organize according to categories used in Appendix B, "Key Assumptions and Success Criteria."*

8.1 Waste Treatment Complex

System Planning Process Improvements
Mission Analysis

8.2 Tank Farms

Sludge Feed Management
Waste Transfer Systems
Waste Chemistry and Solubility
Feed Specifications

8.3 Waste Treatment Plant

Continued Participation in the Chemical Process Control Team
Adopt Thin-Walled HLW Glass Canisters

8.4 Supplemental Treatment

Sodium Management
Supplemental Treatment Facility Capacity Determinations

8.5 Interfacing Facilities

Implement updated planning assumptions regarding relationships between RPP and other organizations as appropriate (Federal Repository, bulk sodium from FFTF, Cs/Sr capsules disposition, spent HLW melter disposition)

8.6 Cross-Cutting Assumptions

None identified at this time.

9.0 REFERENCES – *update as necessary*

APPENDICES – *update all as necessary*

Appendix A – Glossary - *tweak*

Appendix B – Key Assumptions and Success Criteria – *similar in scope, detail and organization as SP4.*

Appendix C – River Protection Project System Description – *Expand the "reserved for future use" sections as appropriate*

Appendix D – Single-Shell Tank Retrieval Sequence

Appendix E – Case Evaluations and Additional Results – *if needed*

FIGURES

Figure 1 1. Hanford Site Map. – *OK as is*

Figure 1 2. Simplified Process Flow Diagram – *update; may need to show different versions for each case*

Figure 1 3. River Protection Project System Planning – *develop updated version or include additional/supplemental figure that illustrates the iterative nature of planning*

Figure 1 4. Summary Schedule – *new summary level schedule of the entire treatment mission, showing key decisions points, key activities (design-construction, startup, closure) of all major program elements and facilities. Level of detail and presentation to be similar to that used in the old Target Baseline.*

Figure 3 1. 200 West Tanks – *update – new file*

Figure 3 2. 200 East Tanks – *update – new file*

Figure 3 3. Hanford Tank Cleanup Status – *update. May consider some other formats for this information.*

Figure 3 4. Waste Transfer System Overview (not including the Aluminum Removal Facility) – *complete re-do. If we want to do a new figure based on an aerial photograph, we'll have to get OPSEC/OUO review before we draft it.*

Figure 3 5. 242-A Evaporator Facility – *better photo of building from ground level?*

Figure 3 6. Interim Hanford Storage Facility/Hanford Shipping Facility – *Is there a new graphic?*

Figure 3 7. Liquid Effluent Retention Facility/Effluent Treatment Facility – *better photo avail?*

Figure 4 1. Hanford Tank Waste Operations Simulator – *OK as is.*

Figure X.X – May include a new figure/table defining the various Technology Readiness Level, cut and pasted from an existing DOE document. Include if TRLs have already been defined for various technologies discussed in §6.0; if no TRLs are noted in §6.0, no need for new Figure.

All text and figures in Section 5.0 will be new

Figure 5 1. Simple Mass Balance for the Baseline Case.

Figure 5 2. Overall Single-Shell Tank Retrieval Progress.

Figure 5 3. General Timing of Single-Shell Tanks Retrievals by Tank Farm.

Figure 5 4. Single-Shell Tank Retrieval Sequence and Timing for the Baseline Case.

Figure 5 5. DST Utilization Logic in HTWOS

Figure 5 6. Use of the Double-Shell Tanks through 2025.

Figure 5 7. Available Double-Shell Tank Space.

Figure 5 8. Projected Double-Shell Tank Transfer Demand.

Figure 5 9. Projected Operation of the 242-A Evaporator for the Mission Duration.

Figure 5 10. Projected High-Level Waste Glass Production.

Figure 5 11. Projected Low-Activity Waste Glass Production.

Figure 5 12. Interim High-Level Waste Storage and Shipping Projections for Baseline Case.

Figure 5 13. Comparison of LAW Glass Mass Between System Plan Revisions 4 and 5.

TABLES – *Assume complete re-do on all tables*

Table 1 1. System Plan (Revision 5) Highlights.

Table 3 1. Tank Farm Waste Volumes.

Table 5 2. Adjusted Plans for Double-Shell Tank Transfers and 242-A Evaporator Campaigns

Table 5 3. Summary of LAW Glass Mass Changes Between System Plan Revisions 3 and 4.

Table 7 1. Key Issues and Uncertainties – update approach by adding status for each potential mitigating action (WBS# for each action, and in which fiscal year it is funded, or if funding is pending)